Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022

Subject Code:3170924   **Date:05-01-2023**
Subject Name:AI and Machine Learning
Time:10:30 AM TO 01:00 PM   **Total Marks:70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
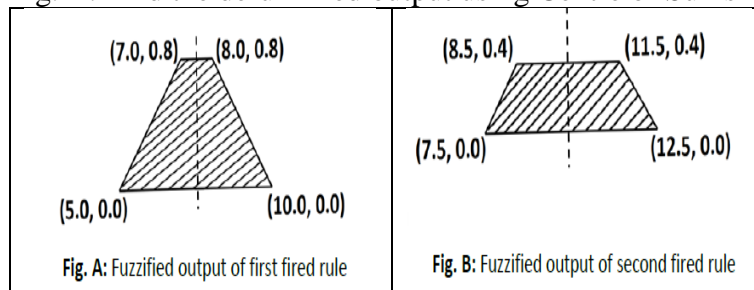4. **Simple and non-programmable scientific calculators are allowed**

			MARKS
Q.1	**(a)**	With reference to machine learning, explain the meaning of the term 'inductive bias'.	**3**
	(b)	Define and explain supervised and unsupervised learning.	**4**
	(c)	Give a brief review of the history of Artificial Intelligence.	**7**
Q.2	**(a)**	State the difference between fuzzy and crisp logic with the help of an example	**3**
	(b)	What is cross validation? Explain k-fold cross validation and discuss how final accuracy is calculated in k-fold cross validation?	**4**
	(c)	Explain the concept of Artificial neurons. Discuss the different types of activation functions employed in neural networks	**7**

OR

	(c)	Explain back propagation neural networks. Discuss the steps involved in back propagation algorithm.	**7**
Q.3	**(a)**	Define feature selection in machine learning. Enlist the steps involved.	**3**
	(b)	Explain linear regression method used for prediction of output	**4**
	(c)	In Mamdani approach, assume that two rules are going to be fired for a set of inputs. The fuzzified outputs of two fired rules are shown in Fig. A and Fig. B. Find the defuzzified output using Centre of Sums method.	**7**

Fig. A: Fuzzified output of first fired rule   Fig. B: Fuzzified output of second fired rule

(7.0, 0.8) (8.0, 0.8)   (8.5, 0.4) (11.5, 0.4)
(5.0, 0.0) (10.0, 0.0)   (7.5, 0.0) (12.5, 0.0)

OR

Q.3	**(a)**	What is feature extraction? Explain how dimensionality reduction can be achieved using feature extraction technique	**3**

(b)	Explain logistic regression method. Discuss how logistic regression differs from linear regression.	**4**
(c)	Discuss the different types of membership functions used in fuzzy logic	**7**

Q.4 **(a)** Explain why Genetic Algorithms are less likely to get stuck in local optimum? **3**

(b) What is the purpose of selection (reproduction) operator in Genetic Algorithm? Explain any one selection operator in detail. **4**

(c) With the help of flowchart, explain the working of Genetic Algorithms **7**

OR

Q.4 **(a)** What is collaborative filtering? Why it is used in recommender systems? **3**

(b) The decision variables x1 and x2 in Genetic Algorithms are represented by x1 = 110011 and x2 = 001101. Find the value of x1 and x2 if the limits on decision variables for x1 is between 0 to 5 and for x2 is between 2 to 7.5 **4**

(c) Explain any one Genetic Algorithm based application **7**

Q.5 **(a)** What are decision trees? Explain the meaning of decision node and leaf node. **3**

(b) How is entropy calculated in decision trees? What would be the value of entropy if we have full knowledge about the system? **4**

(c) What is support vector machine? Also explain the concept of hyperplanes, support vectors and the kernel trick in SVM **7**

OR

Q.5 **(a)** Is clustering approach supervised or unsupervised method of learning? Explain with the help of appropriate example. **3**

(b) Explain agglomerative hierarchical clustering in brief. **4**

(c) Explain K-means clustering in detail. Discuss any one method to decide upon the number of clustersrequired for a particular problem. **7**